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FEE TRANSMITTAL
For FY 2009

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 540.00

Complete if Known	
Application Number	09/943,758
Filing Date	September 4, 2001
First Named Inventor	VADIM YEVGENYEVICH BANINE
Examiner Name	Nguyen, Lam S.
Art Unit	2853
Attorney Docket No.	081468-0282980

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☒ Deposit Account Deposit Account Number: 033975 Deposit Account Name: PILLSBURY WINTHROP SHAW PITTMAN LLP

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☒ Charge fee(s) indicated below, **except for the filing fee**

☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☐ Credit any overpayments

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES Fee ($)	FILING FEES Small Entity Fee ($)	SEARCH FEES Fee ($)	SEARCH FEES Small Entity Fee ($)	EXAMINATION FEES Fee ($)	EXAMINATION FEES Small Entity Fee ($)	Fees Paid ($)
Utility	330	165	540	270	220	110	
Design	220	110	100	50	140	70	
Plant	220	110	330	165	170	85	
Reissue	330	165	540	270	650	325	
Provisional	220	110	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	52	26
Each independent claim over 3 (including Reissues)	220	110
Multiple dependent claims	390	195

Total Claims	Extra Claims	Fee ($)	Fee Paid ($)
_____ - 20 or HP =	_____	x _____	= _____

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims	Extra Claims	Fee ($)	Fee Paid ($)
_____ - 3 or HP =	_____	x _____	= _____

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims Fee ($)	Multiple Dependent Claims Fee Paid ($)
_____	_____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $270 ($135 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
_____ - 100 =	_____ / 50 =	_____ (round up to a whole number) x	270.00 =	0.00

4. OTHER FEE(S)

	Fees Paid ($)
Non-English Specification, $130 fee (no small entity discount)	
Other (e.g., late filing surcharge): Appeal Brief	540.00

SUBMITTED BY

Signature		Registration No. (Attorney/Agent) 42663	Telephone 703.770.7794
Name (Print/Type)	Jean-Paul G. Hoffman		Date November 6, 2008

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: BANINE et al.

Application No.: 09/943,758 Group No.: 2853

Filed: September 4, 2001 Examiner: Nguyen, Lam S.

Title: LITHOGRAPHIC PROJECTION APPARATUS, DEVICE MANUFACTURING METHOD AND DEVICE MANUFACTURED THEREBY

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Appeal is from the Final Office Action dated March 26, 2008, rejecting claims 1-13, 15, 16, and 18-26 of the above-identified patent application. This Appeal Brief is in furtherance of the Notice of Appeal and the Pre-Appeal Brief Request both filed July 21, 2008. The Panel Decision from the Pre-Appeal Brief Review, dated September 9, 2008, indicated that the application remains under appeal because there is at least one issue for appeal.

The Director is authorized to charge the $540.00 fee for filing an Appeal Brief pursuant to 37 C.F.R. § 41.20(b)(2). The Director is further authorized to charge any additional fees that may be due, or credit any overpayment of same to Deposit Account No. 033975 (**Ref. No. 081468-0282980**).

11/07/2008 JADD01 00000020 033975 09943758
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REQUIREMENTS OF 37 C.F.R. §41.37

I. 37 C.F.R. § 41.37(c)(1)(i) – REAL PARTY IN INTEREST

The real party in interest in this appeal is ASML NETHERLANDS B.V., by way of an Assignment recorded March 28, 2002, in the U.S. Patent and Trademark Office at Reel 012735, Frame 0001.

II. 37 C.F.R. § 41.37(c)(1)(ii) – RELATED APPEALS AND INTERFERENCES

There are no related appeals and/or interferences.

III. 37 C.F.R. § 41.37(c)(1)(iii) – STATUS OF CLAIMS

Pending: Claims 1-13, 15, 16, and 18-26 are pending.

Cancelled: Claims 14 and 17 have been cancelled.

Rejected: Claims 1-13, 15, 16, and 18-26 stand rejected.

Allowed: No claims have been allowed.

On Appeal: The rejections of claims 1-13, 15, 16, and 18-26 are appealed.

IV. 37 C.F.R. § 41.37(c)(1)(iv) – STATUS OF AMENDMENTS

No amendments have been filed subsequent to the Final Office Action dated March 26, 2008.

V. 37 C.F.R. § 41.37(c)(1)(v) – SUMMARY OF CLAIMED SUBJECT MATTER

The following explanation of the claimed subject matter, with reference to the specification and drawings, is for explanation only and is not to be construed, in any way, as an admission that the claims are limited to the particularly disclosed embodiments. Rather, such description is intended to facilitate an understanding of the claims by the Board and is absolutely not intended to operate as comprehensive claim construction. The invention is not limited to the disclosed embodiments.

Claim 1

The invention of claim 1 concerns a lithographic projection apparatus (e.g., page 9, line 5-page 10, line 32; Figs. 1 and 2) that includes a radiation system to supply a projection beam of radiation (e.g., page 9, lines 7-9; Fig, 1, illuminator IL), a support structure adapted to support patterning structure which can be used to pattern the projection beam according to a desired pattern (e.g., page 9, lines 10-12; Fig. 1, mask table MT to hold mask MA), a substrate table to hold a substrate (e.g., page 9, lines 13-15; Fig. 1, wafer table WT to hold wafer W), and a projection system to project the patterned beam onto a target portion of the substrate (e.g., page 9, lines 16-21; Fig. 1, projection system PL). The lithographic projection apparatus further includes a gas supply, configured and arranged to supply a gaseous hydrocarbon to a space containing a mirror (e.g., page 11, lines 10-13; Fig. 1, gas supply 6, chamber 3, and mirror CM), a reflectivity sensor to monitor a reflectivity of said mirror and/or a pressure sensor to monitor a background pressure

in said space (e.g., page 11, lines 14-20; Fig. 1, pressure sensor 5 and/or reflectivity sensor 7), and a gas supply control to control said gas supply to control, responsive to a signal from said at least one sensor, a thickness of a layer of hydrocarbon formed on the mirror using the gaseous hydrocarbon (e.g., page 6, lines 10-22; page 11, lines 10-20; and page 11, line 25-page 12, line 9).

Claim 10

The invention of claim 10 concerns a method of manufacturing a device using a lithographic projection apparatus (e.g., page 9, line 5-page 10, line 32; Figs. 1 and 2) that includes projecting a patterned beam of radiation onto a target portion of a layer of radiation-sensitive material on a substrate (e.g., page 9, lines 16-21; Fig. 1, beam PB projected onto wafer W). The method further includes supplying a gaseous hydrocarbon to a space within the lithographic projection apparatus containing a mirror (e.g., page 11, lines 10-13; Fig. 1, gas supply 6, chamber 3, and mirror CM), monitoring a reflectivity of said mirror and/or a background pressure in said space (e.g., page 11, lines 14-20; Fig. 1, pressure sensor 5 and/or reflectivity sensor 7), and controlling an amount of gaseous hydrocarbon supplied to said space to control, in response to the monitoring, a thickness of a hydrocarbon layer formed on the mirror using the gaseous hydrocarbon (e.g., page 6, lines 10-22; page 11, lines 10-20; and page 11, line 25-page 12, line 9).

Claim 15

The invention of claim 15 concerns a method of manufacturing a device using

a lithographic projection apparatus (page 9, line 5-page 10, line 32; see, e.g., Figs. 1 and 2) that includes projecting a patterned beam of radiation onto a target portion of a layer of radiation-sensitive material on a substrate (e.g., page 9, lines 16-21; beam PB projected onto wafer W). The method further includes supplying a gaseous alcohol to a space in a radiation system of the lithographic projection apparatus, which space contains a mirror (e.g., page 11, lines 10-13; Fig. 1, gas supply 6, chamber 3, and mirror CM), wherein the alcohol forms a cap layer on said mirror, wherein the projecting causes sputtering of the cap layer, and wherein the gaseous alcohol is supplied to said space at a pressure sufficient to achieve a thickness of said cap layer which does not increase substantially over time (e.g., page 12, line 12-page 13, line 18).

Claim 20

The invention of claim 20 concerns a lithographic projection apparatus (e.g., page 9, line 5-page 10, line 32; Figs. 1 and 2) including a support structure adapted to support patterning structure which can be used to pattern a beam of radiation according to a desired pattern (e.g., page 9, lines 10-12; Fig. 1, mask table MT to hold mask MA), a substrate table to hold a substrate (e.g., page 9, lines 13-15; Fig. 1, wafer table WT to hold wafer W), and a projection system to project the patterned beam onto a target portion of the substrate (e.g., page 9, lines 16-21; Fig. 1, projection system PL). The lithographic projection apparatus further includes a gas supply configured to supply a gaseous hydrocarbon to a space containing a mirror (e.g., page 11, lines 10-13; Fig. 1, gas supply 6, chamber 3, and mirror CM), and a

gas supply control configured to control supply of the gaseous hydrocarbon to the space to maintain a layer formed on the mirror using the gaseous hydrocarbon at a substantially constant thickness in response to at least sputtering caused during supply of the projection beam (e.g., page 6, lines 10-22; page 11, lines 10-20; and page 11, line 25-page 12, line 9).

VI. 37 C.F.R. § 41.37(c)(1)(vi) – GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

In the Final Office Action dated March 26, 2008, claims 1-13, 15, 16, and 18-26 were rejected as follows:

1) Claims 1-12, 15, 16, and 18-26 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over European Patent Application Publication No. EP 1020897 A1 to Tanaka et al. ("Tanaka") in view of U.S. Patent No. 6,533,952 to Klebanoff et al. ("Klebanoff"); and

2) Claim 13 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Tanaka, in view of Klebanoff, and further in view of U.S. Patent No. 6,469,785 to Duveneck et al. ("Duveneck").

Thus, the grounds of rejection to be reviewed on appeal are:

1) Whether claims 1-12, 15, 16, and 18-26 are patentable over Tanaka in view of Klebanoff; and

2) Whether claim 13 is patentable over Tanaka, in view of Klebanoff, and further in view of Duveneck.

VII. 37 C.F.R. § 41.37(c)(1)(vii) – ARGUMENT

A. Rejection under 35 U.S.C. §103(a) of claims 1-12, 15, 16, and 18-26 over Tanaka in view of Klebanoff.

Claim 1

Appellant submits that the cited portions of Tanaka and Klebanoff do not at least disclose, teach, or render obvious a lithographic projection apparatus comprising, *inter alia*, a gas supply, configured and arranged to supply a gaseous hydrocarbon to a space containing a mirror; at least one sensor selected from the group comprising a reflectivity sensor to monitor a reflectivity of said mirror and a pressure sensor to monitor a background pressure in said space; and a gas supply control to control said gas supply to control, responsive to a signal from said at least one sensor, a thickness of a layer of hydrocarbon formed on the mirror using the gaseous hydrocarbon, as recited in claim 1.

Gaseous Hydrocarbon and the Hydrocarbon Layer

Appellant submits, and the Final Office Action confirms, that the cited portions of Tanaka do not disclose supply of gaseous hydrocarbon of any kind.

Consequently, the cited portions of Tanaka cannot disclose, teach, or render obvious a layer of hydrocarbon as recited.

In order to overcome the admitted deficiencies of the cited portions of Tanaka, the Final Office Action alleged that the cited portions of Klebanoff disclose the claimed layer of hydrocarbon. Even assuming *arguendo* that the cited portions of Tanaka and Klebanoff are properly combinable (which Appellant does not concede at least for reasons discussed below), the cited portions of Klebanoff fail to overcome the deficiencies of the cited portions of Tanaka.

For example, the cited portions of Klebanoff are silent as to a hydrocarbon layer, film, or any appropriate hydrocarbon layer synonym. Rather, Klebanoff discloses "an oxide film" (e.g., column 5, line 32), "carbon films" (e.g., column 6, line 16), "graphitic carbon film" (e.g., column 5, line 4), or SiO_2 layer (e.g., column 2, line 42), but not a hydrocarbon layer or film. Thus, Klebanoff regularly uses the terms "layer" and "film" but not in association with hydrocarbon; rather, those terms are used in association with graphitic carbon or oxide. Accordingly, there is no disclosure or teaching in the cited portions of Klebanoff of a layer of hydrocarbon; at most, the cited portions of Klebanoff disclose a graphitic carbon or oxide layer.

To overcome this disclosure discrepancy, the Final Office Action appears to rely on the theory of inherency to support the assertion that the cited portions of Klebanoff teach or disclose the recited layer of hydrocarbon. However, the Final Office Action has provided no evidence that a layer of hydrocarbon is an inherent teaching of Klebanoff. See MPEP §2112 ("In relying upon the theory of inherency,

the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original)). MPEP §2112 also states that "[t]he fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic" quoting *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (emphasis in original). Also, "[t]o establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient," quoting *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted).

Appellant submits that presence of a hydrocarbon in an atmosphere in contact with a mirror surface in Klebanoff does not necessarily result (as required for inherency - see MPEP § 2112) in a formation of a layer of hydrocarbon on the mirror surface in Klebanoff. Hydrocarbon layer formation is conditioned on a number of factors such as the number of the available hydrocarbon molecules and surface conditions like temperature, surface geometry, surface potential, surface irradiation, impurities present on the surface, etc. The cited portions of Klebanoff are silent as to whether the conditions for hydrocarbon film formation are present. Indeed, the cited

portions of Klebanoff explicitly state that "the sticking coefficient for both ethanol and water on a graphitic carbon is very small" (column 5, lines 3-4) meaning that carbon on the surface prevents or limits hydrocarbon adsorption. Moreover, Klebanoff states that ethanol molecules "bound to surface 210 will also be dissociated by the secondary electrons ejected from that surface." See Klebanoff, col. 3, line 66 - col. 4, line 2. Thus, ethanol molecules in Klebanoff will not remain on the surface 210 for any significant amount of time and there is no indication that they will form a layer.

Further, Klebanoff states that a "small amount of hydrocarbon" binds to the surface in addition to other materials (e.g., water). See Klebanoff: col. 2, lines 14-16. There is by no means sufficient disclosure of a hydrocarbon layer in Klebanoff nor does the presence of a small amount of hydrocarbon in Klebanoff necessarily result in a hydrocarbon layer. For instance, Figures 1 and 2 of Klebanoff merely show a single hydrocarbon atom absorbed to the respective surfaces. No person skilled in the art would consider Figures 1 and 2 as showing a layer of hydrocarbon. Consequently, Appellant submits that the Final Office Action has not established sufficiently, with proper evidence and a reasoned basis, that the presence of hydrocarbon in Klebanoff necessarily and inherently results in a layer of hydrocarbon on a surface.

Sensor and the Gas Supply Control

Appellant further submits that the cited portions of Klebanoff fail to disclose, teach or suggest any sort of gas supply control, let alone one responsive to a signal

from a sensor such as a reflectivity sensor or a pressure sensor or one configured to control a gas supply to control a thickness of a layer of hydrocarbon formed on the mirror using gaseous hydrocarbon supplied by the gas supply.

Even assuming *arguendo* that the cited portions of Tanaka and Klebanoff are properly combinable (which Appellant does not concede at least for reasons discussed below), Appellant submits that the cited portions of Tanaka fail to overcome the shortcomings of the cited portions of Klebanoff. For example, the pressure sensor of Tanaka is merely used to determine whether a space in the optical system of Tanaka has been sufficiently evacuated so that the inert gas can be introduced and then to monitor the supply of the inert gas so as not to be overly pressurized to thereby impact optical performance. See, e.g., Tanaka, paragraphs [0044] and [0054]. Further, the pressure sensor of Tanaka is merely used to control a lens element to optically compensate for the pressure of the inert gas. See, e.g., Tanaka, paragraph [0041].

However, Appellant respectfully submits that the cited portions of Tanaka fail to disclose or teach a gas supply control to control a gas supply to control, responsive to a signal from, e.g., a pressure sensor, a thickness of a layer of hydrocarbon formed on a mirror using gaseous hydrocarbon supplied from the gas supply. Even if the system disclosed in the cited portions of Tanaka were modified to include supply of a hydrocarbon (which Appellant disagrees it properly could in view of Klebanoff as discussed below), it is respectfully submitted that the cited portions of Tanaka fail to provide any disclosure or teaching regarding a control system to

control supply of a gas to control a thickness of a layer of hydrocarbon formed on an optical element. The cited portions of Tanaka at most teach controlling whether the pressure is too high or low in the space but in no way teach control of the supply of gas to control a thickness of a layer of hydrocarbon formed on an optical element. Indeed, the cited portions of Tanaka do not even disclose a layer formed on an optical element and consequently cannot even teach or suggest control supply of a gas to control the thickness of such a layer.

Improper Combination of Tanaka and Klebanoff

Appellant submits that a proper *prima facie* case of obviousness has not been established because the cited portions of Tanaka and Klebanoff are improperly combined. In particular, the cited portions of Klebanoff and Tanaka conflict, the proposed modification of the system described in the cited portions of Tanaka would render the Tanaka system unsatisfactory for its intended purpose, and a reasonable expectation of success for the proposed modification has not been set forth.

The Final Office Action essentially proposes that the inert gas disclosed in the cited portions of Tanaka may be supplemented with a hydrocarbon or else substituted with a hydrocarbon. Respectfully, this is contrary to the teachings regarding the system described in the cited portions of Tanaka. Such a combination or substitution would render the Tanaka system unsatisfactory for its intended purpose. In particular, the cited portions of Tanaka disclose the aim of having an optical system with hardly any ArF excimer laser light attenuation. See, e.g., Tanaka,

para. [0008]. To that end, the cited portions of Tanaka disclose circulating inert gas through spaces in the optical system to improve transmittance by removing "foreign matter...such as water and hydrocarbons or other substances that diffuse the exposure light [, that] become adhered to the lenses 21 or suspended within the light path." See Tanaka, paras. [0045], [0088]. Therefore, the Final Office Action's contention that Tanaka's system may be configured to add a hydrocarbon, which Tanaka characterizes as "foreign matter" that attenuates ArF laser light and which Tanaka expressly discloses removing through circulation of inert gas, simply flies in the face of Tanaka's teachings and the understanding of those skilled in the art. Indeed, Appellant submits that the cited portions of Tanaka expressly teach against supplying a hydrocarbon into the spaces in an optical system and thus cannot be combinable with any art that teaches such supply of a hydrocarbon into a space having an optical element.

Indeed, the cited portions of Klebanoff provide teachings that clearly conflict with Tanaka and that would render the modified Tanaka system unsatisfactory. Particularly, the cited portions of Klebanoff disclose supplying a hydrocarbon but in combination with the presence of water vapor and EUV radiation. See, e.g., Klebanoff, col. 3, lines 60 to col. 4, line 7. Moreover, the presence of such a hydrocarbon can lead to reduction in the reflectivity of mirror surfaces. See, e.g., Klebanoff, col. 4, lines 8-15. To help overcome this reduction of reflectivity, Klebanoff discloses providing oxygen containing gas. Thus, the cited portions of Klebanoff disclose providing hydrocarbon, water vapor and oxygen, each of which

the cited portions of Tanaka expressly teach to keep out of the optical system to improve transmittance. Thus, the addition of hydrocarbon in the Tanaka system directly conflicts with the teachings of Tanaka and would render the Tanaka system unsatisfactory for its intended purpose of having high transmittance.

Further, even if the proposed combination were otherwise proper, the Final Office Action has not shown a reasonable expectation of success for the proposed combination. The teachings of Klebanoff relate to high energy radiation, such as EUV radiation, while the teachings of Tanaka relate to relatively low energy radiation, i.e., ArF laser radiation. The Final Office Action has not established, based on evidence of record, that the introduction of a hydrocarbon as taught by Klebanoff would be effective in the ArF system described in the cited portions of Tanaka and the Final Office Action has not made the appropriate showing that there would be a reasonable expectation of success.

Claim 10

Appellant submits that the cited portions of Tanaka and Klebanoff do not disclose, teach, or render obvious a method of manufacturing a device using a lithographic projection apparatus comprising, *inter alia*, supplying a gaseous hydrocarbon to a space within the lithographic projection apparatus containing a mirror; monitoring at least one of a reflectivity of said mirror and a background pressure in said space; and controlling an amount of gaseous hydrocarbon supplied to

said space to control, in response to the monitoring, a thickness of a hydrocarbon layer formed on the mirror using the gaseous hydrocarbon, as recited in claim 10.

Gaseous Hydrocarbon and the Hydrocarbon Layer

Appellant submits, and the Final Office Action confirms, that the cited portions of Tanaka do not disclose supply of gaseous hydrocarbon of any kind. Consequently, the cited portions of Tanaka cannot disclose, teach, or render obvious a layer of hydrocarbon as recited.

In order to overcome the admitted deficiencies of the cited portions of Tanaka, the Final Office Action alleged that the cited portions of Klebanoff disclose the claimed layer of hydrocarbon. Even assuming *arguendo* that the cited portions of Tanaka and Klebanoff are properly combinable (which Appellant does not concede at least for reasons discussed below), the cited portions of Klebanoff fail to overcome the deficiencies of the cited portions of Tanaka.

For example, the cited portions of Klebanoff are silent as to a hydrocarbon layer, film, or any appropriate hydrocarbon layer synonym. Rather, Klebanoff discloses "an oxide film" (e.g., column 5, line 32), "carbon films" (e.g., column 6, line 16), "graphitic carbon film" (e.g., column 5, line 4), or SiO_2 layer (e.g., column 2, line 42), but not a hydrocarbon layer or film. Thus, Klebanoff regularly uses the terms "layer" and "film" but not in association with hydrocarbon; rather, those terms are used in association with graphitic carbon or oxide. Accordingly, there is no disclosure

or teaching in the cited portions of Klebanoff of a layer of hydrocarbon; at most, the cited portions of Klebanoff disclose a graphitic carbon or oxide layer.

To overcome this disclosure discrepancy, the Final Office Action appears to rely on the theory of inherency to support the assertion that the cited portions of Klebanoff teach or disclose the recited layer of hydrocarbon. However, the Final Office Action has provided no evidence that a layer of hydrocarbon is an inherent teaching of Klebanoff. Appellant submits that presence of a hydrocarbon in an atmosphere in contact with a mirror surface in Klebanoff does not necessarily result (as required for inherency - see MPEP § 2112) in a formation of a layer of hydrocarbon on the mirror surface in Klebanoff. Hydrocarbon layer formation is conditioned on a number of factors such as the number of the available hydrocarbon molecules and surface conditions like temperature, surface geometry, surface potential, surface irradiation, impurities present on the surface, etc. The cited portions of Klebanoff are silent as to whether the conditions for hydrocarbon film formation are present. Indeed, the cited portions of Klebanoff explicitly state that "the sticking coefficient for both ethanol and water on a graphitic carbon is very small" (column 5, lines 3-4) meaning that carbon on the surface prevents or limits hydrocarbon adsorption. Moreover, Klebanoff states that ethanol molecules "bound to surface 210 will also be dissociated by the secondary electrons ejected from that surface." See Klebanoff, col. 3, line 66 - col. 4, line 2. Thus, ethanol molecules in Klebanoff will not remain on the surface 210 for any significant amount of time and there is no indication that they will form a layer.

Further, Klebanoff states that a "small amount of hydrocarbon" binds to the surface in addition to other materials (e.g., water). See Klebanoff: col. 2, lines 14-16. There is by no means sufficient disclosure of a hydrocarbon layer in Klebanoff nor does the presence of a small amount of hydrocarbon in Klebanoff necessarily result in a hydrocarbon layer. For instance, Figures 1 and 2 of Klebanoff merely show a single hydrocarbon atom absorbed to the respective surfaces. No person skilled in the art would consider Figures 1 and 2 as showing a layer of hydrocarbon. Consequently, Appellant submits that the Final Office Action has not established sufficiently, with proper evidence and a reasoned basis, that the presence of hydrocarbon in Klebanoff necessarily and inherently results in a layer of hydrocarbon on a surface.

Monitoring of Pressure and/or Reflective and Controlling Gas Supply

Appellant further submits that the cited portions of Klebanoff fail to disclose, teach or suggest any sort of controlling of a gas supply, let alone one responsive to monitoring of a reflectivity of the mirror and/or a background pressure in the space or one controlling an amount of gas supplied to control a thickness of a hydrocarbon layer formed on the mirror using gaseous hydrocarbon.

Even assuming *arguendo* that the cited portions of Tanaka and Klebanoff are properly combinable (which Appellant does not concede at least for reasons discussed below), Appellant submits that the cited portions of Tanaka fail to overcome the shortcomings of the cited portions of Klebanoff. For example, the

pressure sensor of Tanaka is merely used to determine whether a space in the optical system of Tanaka has been sufficiently evacuated so that the inert gas can be introduced and then to monitor the supply of the inert gas so as not to be overly pressurized to thereby impact optical performance. See, e.g., Tanaka, paragraphs [0044] and [0054]. Further, the pressure sensor of Tanaka is merely used to control a lens element to optically compensate for the pressure of the inert gas. See, e.g., Tanaka, paragraph [0041].

However, Appellant respectfully submits that the cited portions of Tanaka fail to disclose or teach controlling an amount of gaseous hydrocarbon supplied to said space to control, in response to the monitoring of, e.g., pressure, a thickness of a hydrocarbon layer formed on the mirror using the gaseous hydrocarbon. Even if the system disclosed in the cited portions of Tanaka were modified to include supply of a hydrocarbon (which Appellant disagrees it properly could in view of Klebanoff as discussed below), it is respectfully submitted that the cited portions of Tanaka fail to provide any disclosure or teaching regarding a controlling an amount of gas supplied to control a thickness of a hydrocarbon layer formed on an optical element. The cited portions of Tanaka at most teach controlling whether the pressure is too high or low in the space but in no way teach controlling an amount of gas supplied to control a thickness of a hydrocarbon layer formed on an optical element. Indeed, the cited portions of Tanaka do not even disclose a layer formed on an optical element and consequently cannot even teach or suggest controlling an amount of gas supplied to control the thickness of such a layer.

Improper Combination of Tanaka and Klebanoff

Appellant submits that a proper *prima facie* case of obviousness has not been established because the cited portions of Tanaka and Klebanoff are improperly combined. In particular, the cited portions of Klebanoff and Tanaka conflict, the proposed modification of the system described in the cited portions of Tanaka would render the Tanaka system unsatisfactory for its intended purpose, and a reasonable expectation of success for the proposed modification has not been set forth.

The Final Office Action essentially proposes that the inert gas disclosed in the cited portions of Tanaka may be supplemented with a hydrocarbon or else substituted with a hydrocarbon. Respectfully, this is contrary to the teachings regarding the system described in the cited portions of Tanaka. Such a combination or substitution would render the Tanaka system unsatisfactory for its intended purpose. In particular, the cited portions of Tanaka disclose the aim of having an optical system with hardly any ArF excimer laser light attenuation. See, e.g., Tanaka, para. [0008]. To that end, the cited portions of Tanaka disclose circulating inert gas through spaces in the optical system to improve transmittance by removing "foreign matter...such as water and hydrocarbons or other substances that diffuse the exposure light [, that] become adhered to the lenses 21 or suspended within the light path." See Tanaka, paras. [0045], [0088]. Therefore, the Final Office Action's contention that Tanaka's system may be configured to add a hydrocarbon, which Tanaka characterizes as "foreign matter" that attenuates ArF laser light and which Tanaka expressly discloses removing through circulation of inert gas, simply flies in

the face of Tanaka's teachings and the understanding of those skilled in the art. Indeed, Appellant submits that the cited portions of Tanaka expressly teach against supplying a hydrocarbon into the spaces in an optical system and thus cannot be combinable with any art that teaches such supply of a hydrocarbon into a space having an optical element.

Indeed, the cited portions of Klebanoff provide teachings that clearly conflict with Tanaka and that would render the modified Tanaka system unsatisfactory. Particularly, the cited portions of Klebanoff disclose supplying a hydrocarbon but in combination with the presence of water vapor and EUV radiation. See, e.g., Klebanoff, col. 3, lines 60 to col. 4, line 7. Moreover, the presence of such a hydrocarbon can lead to reduction in the reflectivity of mirror surfaces. See, e.g., Klebanoff, col. 4, lines 8-15. To help overcome this reduction of reflectivity, Klebanoff discloses providing oxygen containing gas. Thus, the cited portions of Klebanoff disclose providing hydrocarbon, water vapor and oxygen, each of which the cited portions of Tanaka expressly teach to keep out of the optical system to improve transmittance. Thus, the addition of hydrocarbon in the Tanaka system directly conflicts with the teachings of Tanaka and would render the Tanaka system unsatisfactory for its intended purpose of having high transmittance.

Further, even if the proposed combination were otherwise proper, the Final Office Action has not shown a reasonable expectation of success for the proposed combination. The teachings of Klebanoff relate to high energy radiation, such as EUV radiation, while the teachings of Tanaka relate to relatively low energy

radiation, i.e., ArF laser radiation. The Final Office Action has not established, based on evidence of record, that the introduction of a hydrocarbon as taught by Klebanoff would be effective in the ArF system described in the cited portions of Tanaka and the Final Office Action has not made the appropriate showing that there would be a reasonable expectation of success.

Claim 15

Appellant submits that the cited portions of Tanaka and Klebanoff do not disclose, teach, or render obvious a method of manufacturing a device using a lithographic projection apparatus comprising, *inter alia*, supplying a gaseous alcohol to a space in a radiation system of the lithographic projection apparatus, which space contains a mirror, wherein the alcohol forms a cap layer on said mirror, wherein the projecting causes sputtering of the cap layer, and wherein the gaseous alcohol is supplied to said space at a pressure sufficient to achieve a thickness of said cap layer which does not increase substantially over time, as recited in claim 15, whether, for example, the cap layer is an alcohol layer, a carbon layer, or a combination thereof.[1]

The cited portions of Tanaka do not disclose, teach, or render obvious supply of a gaseous alcohol to a space. Further, the cited portions of Tanaka are silent as to sputtering. And, accordingly, the cited portions of Tanaka are silent as to gaseous alcohol supplied to the space at a pressure sufficient to achieve a thickness of a cap layer which does not increase substantially over time.

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[1] Appellant would like to clarify that the cap layer need not be an alcohol layer

Even assuming *arguendo* that the cited portions of Tanaka and Klebanoff are properly combinable (which Appellant does not concede at least for reasons discussed below), Appellant submits that the cited portions of Klebanoff fail to overcome the shortcomings of the cited portions of Tanaka. For example, like the cited portions of Tanaka, Appellant submits that the cited portions of Klebanoff fail to disclose or teach sputtering. Further, Appellant submits that the cited portions of Klebanoff fail to disclose or teach, in the context of sputtering, gaseous alcohol supplied to a space at a pressure sufficient to achieve a thickness of a cap layer which does not increase substantially over time, as recited in claim 15.

Sputtering

The Final Office Action alleged that the cited portions of Klebanoff disclose sputtering by incident radiation. However, there is no disclosure or teaching in the cited portions of Klebanoff of sputtering. The well-known technical term "sputtering" involves removing material due to bombardment of the material by energetic ions. The cited portions of Klebanoff merely disclose ejection of secondary electrons from the surface of a material by high energy radiation, such as EUV radiation and disclose dissociation (a chemical process) caused by those electrons.

The Final Office Action attempted to redefine "sputtering" by alleging that it is synonymous with "projecting or radiating the patterned/projection beam on the cap layer". See page 6 of the Final Office Action. No person skilled in the art would

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and disclaims any prior statements or positions inconsistent therewith.

reasonably consider those as being synonymous in view of the well known technical meaning of "sputtering" or in view of Appellant's specification. Projecting or radiating a patterned/projection beam need not involve sputtering and sputtering need not involve projecting or radiating a patterned/projection beam. See MPEP §2111 (claims must be given their broadest reasonable interpretation consistent with the specification) and paragraph [0024] of Appellant's specification ("... a cap layer on a mirror surface can be used to protect the mirror from sputtering damage caused by fast ions and atoms expelled from a plasma source.").

Thus, Appellant submits that the cited portions of Klebanoff are simply silent as to sputtering of anything, let alone sputtering of the cap layer as recited in claim 15.

Control of Thickness of a Cap Layer

Appellant also submits that the cited portions of Klebanoff fail to disclose or teach, in the context of sputtering, gaseous alcohol supplied to a space at a pressure sufficient to achieve a thickness of a cap layer which does not increase substantially over time, as recited in claim 15.

The Final Office Action alleged (see page 4 of the Final Office Action) that:

> [Klebanoff's disclosure of] *'Prior to exposing surface 210 to incident radiation, a small amount of a hydrocarbon gas that will also bind to surface 210 is admitted to the system' means that the binding of the hydrocarbon gas to the surface 210 forms a cap layer of hydrocarbon on the surface 210 before the cap layer is sputtered by the incident radiation. Moreover, because the sputtering will cause the hydrocarbon molecules bound to the surface 210 be dissociated, the*

> *thickness of the cap layer of hydrocarbon would not increase substantially over time. In addition, since the pressure gas is maintained at a certain value, the thickness of the hydrocarbon layer would not increase substantially over time due to the increase of the pressure gas*), wherein, in use, the layer of hydrocarbon is formed on the mirror by absorption of the gaseous hydrocarbon (*column 2, lines 14-16: 'Surface 110 has both hydrocarbon and water molecules adsorbed thereon'*)" (emphasis in original).

Appellant respectfully traverses this allegation as at least unsupported by the cited reference.

First, Appellant submits that there is no support in the cited portions of Klebanoff, nor does it necessarily result from the cited portions of Klebanoff, that there would be a cap layer as claimed. For example, Klebanoff warns against a graphitic carbon film and teaches to remove such a film. See, e.g., Klebanoff, col. 4, lines 8-21. Accordingly, even in the absence of sputtering, Klebanoff teaches against a cap layer. Further, there is no disclosure or teaching in the cited portions of Klebanoff that there would be a cap layer maintained in an environment of sputtering. Rather, sputtering would remove any layer. See, e.g., paragraph [0023] of Appellant's specification ("...the cap layer is gradually destroyed by sputtering.") Accordingly, Appellant submits that there is no disclosure or teaching in the cited portions of Klebanoff of maintaining a cap layer in view of sputtering, let alone of gaseous alcohol supplied to a space at a pressure sufficient to achieve a thickness of a cap layer which does not increase substantially over time.

Further, the allegation that "since the pressure gas is maintained at a certain value, the thickness of the hydrocarbon layer would not increase substantially over

time due to the increase of the pressure gas" is not supported by the cited portions of Klebanoff. All pressures and partial pressures disclosed by Klebanoff are filling pressures. Klebanoff is silent as to the allegation that "the pressure gas is maintained at a certain value." Even if *arguendo* the pressure of the gas in Klebanoff were maintained at a certain value, there is simply no disclosure of, nor would it necessarily result, that a constant pressure would ensure that a thickness of a cap layer would not increase substantially over time as alleged. For example, the cap layer could simply be removed by the sputtering leaving no cap layer. Thus, keeping the pressure constant may have no effect. Moreover, there is no disclosure, nor would it necessarily result, that an increasing pressure would cause increase of the thickness of a layer.

Thus, Appellant submits that the cited portions of Klebanoff are simply silent as to, in the context of sputtering, gaseous alcohol supplied to a space at a pressure sufficient to achieve a thickness of a cap layer which does not increase substantially over time, as recited in claim 15.

Improper Combination of Tanaka and Klebanoff

Appellant submits that a proper *prima facie* case of obviousness has not been established because the cited portions of Tanaka and Klebanoff are improperly combined. In particular, the cited portions of Klebanoff and Tanaka conflict, the proposed modification of the system described in the cited portions of Tanaka would

render the Tanaka system unsatisfactory for its intended purpose, and a reasonable expectation of success for the proposed modification has not been set forth.

The Final Office Action essentially proposes that the inert gas disclosed in the cited portions of Tanaka may be supplemented with alcohol or else substituted with alcohol. Respectfully, this is contrary to the teachings regarding the system described in the cited portions of Tanaka. Such a combination or substitution would render the Tanaka system unsatisfactory for its intended purpose. In particular, the cited portions of Tanaka disclose the aim of having an optical system with hardly any ArF excimer laser light attenuation. See, e.g., Tanaka, para. [0008]. To that end, the cited portions of Tanaka disclose circulating inert gas through spaces in the optical system to improve transmittance by removing "foreign matter...such as water and hydrocarbons or other substances that diffuse the exposure light [, that] become adhered to the lenses 21 or suspended within the light path." See Tanaka, paras. [0045], [0088]. Therefore, the Final Office Action's contention that Tanaka's system may be configured to add alcohol, which Tanaka characterizes as "foreign matter" that attenuates ArF laser light and which Tanaka expressly discloses removing through circulation of inert gas, simply flies in the face of Tanaka's teachings and the understanding of those skilled in the art. Indeed, Appellant submits that the cited portions of Tanaka expressly teach against supplying a hydrocarbon into the spaces in an optical system and thus cannot be combinable with any art that teaches such supply of a hydrocarbon into a space having an optical element.

Indeed, the cited portions of Klebanoff provide teachings that clearly conflict with Tanaka and that would render the modified Tanaka system unsatisfactory. Particularly, the cited portions of Klebanoff disclose supplying a hydrocarbon but in combination with the presence of water vapor and EUV radiation. See, e.g., Klebanoff, col. 3, lines 60 to col. 4, line 7. Moreover, the presence of such a hydrocarbon can lead to reduction in the reflectivity of mirror surfaces. See, e.g., Klebanoff, col. 4, lines 8-15. To help overcome this reduction of reflectivity, Klebanoff discloses providing oxygen containing gas. Thus, the cited portions of Klebanoff disclose providing hydrocarbon, water vapor and oxygen, each of which the cited portions of Tanaka expressly teach to keep out of the optical system to improve transmittance. Thus, the addition of alcohol in the Tanaka system directly conflicts with the teachings of Tanaka and would render the Tanaka system unsatisfactory for its intended purpose of having high transmittance.

Further, even if the proposed combination were otherwise proper, the Final Office Action has not shown a reasonable expectation of success for the proposed combination. The teachings of Klebanoff relate to high energy radiation, such as EUV radiation, while the teachings of Tanaka relate to relatively low energy radiation, i.e., ArF laser radiation. The Final Office Action has not established, based on evidence of record, that the introduction of a hydrocarbon as taught by Klebanoff would be effective in the ArF system described in the cited portions of Tanaka and the Final Office Action has not made the appropriate showing that there would be a reasonable expectation of success.

Claim 20

Appellant submits that the cited portions of Tanaka and Klebanoff do not disclose, teach, or render obvious a lithographic projection apparatus comprising, *inter alia*, a gas supply configured to supply a gaseous hydrocarbon to a space containing a mirror; and a gas supply control configured to control supply of the gaseous hydrocarbon to the space to maintain a layer formed on the mirror using the gaseous hydrocarbon at a substantially constant thickness in response to at least sputtering caused during supply of the projection beam, as recited in claim 20, whether, for example, the layer is a hydrocarbon layer, a carbon layer, or a combination thereof.[2]

The cited portions of Tanaka do not disclose, teach, or render obvious a gas supply configured to supply a gaseous hydrocarbon to a space. Further, the cited portions of Tanaka are silent as to sputtering. And, accordingly, the cited portions of Tanaka are silent as to a gas supply control configured to control supply of the gaseous hydrocarbon to the space to maintain a layer formed on the mirror using the gaseous hydrocarbon at a substantially constant thickness in response to at least sputtering caused during supply of the projection beam.

Even assuming *arguendo* that the cited portions of Tanaka and Klebanoff are properly combinable (which Appellant does not concede at least for reasons discussed below), Appellant submits that the cited portions of Klebanoff fail to overcome the shortcomings of the cited portions of Tanaka. For example, like the cited portions of Tanaka, Appellant submits that the cited portions of Klebanoff fail to

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[2] Appellant would like to clarify that the layer need not be a hydrocarbon layer

disclose or teach sputtering. Further, Appellant submits that the cited portions of Klebanoff fail to disclose or teach a gas supply control configured to control supply of the gaseous hydrocarbon to the space to maintain a layer formed on the mirror using the gaseous hydrocarbon at a substantially constant thickness in response to at least sputtering caused during supply of the projection beam, as recited in claim 20.

Sputtering

The Final Office Action alleged that the cited portions of Klebanoff disclose sputtering by incident radiation. However, there is no disclosure or teaching in the cited portions of Klebanoff of sputtering. The well-known technical term "sputtering" involves removing material due to bombardment of the material by energetic ions. The cited portions of Klebanoff merely disclose ejection of secondary electrons from the surface of a material by high energy radiation, such as EUV radiation and disclose dissociation (a chemical process) caused by those electrons.

The Final Office Action attempted to redefine "sputtering" by alleging that it is synonymous with "projecting or radiating the patterned/projection beam on the cap layer". See page 6 of the Final Office Action. No person skilled in the art would reasonably consider those as being synonymous in view of the well known technical meaning of "sputtering" or in view of Appellant's specification. Projecting or radiating a patterned/projection beam need not involve sputtering and sputtering need not involve projecting or radiating a patterned/projection beam. See MPEP §2111

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and disclaims any prior statements or positions inconsistent therewith.

(claims must be given their broadest reasonable interpretation consistent with the specification) and paragraph [0024] of Appellant's specification ("... a cap layer on a mirror surface can be used to protect the mirror from sputtering damage caused by fast ions and atoms expelled from a plasma source.").

Thus, Appellant submits that the cited portions of Klebanoff are simply silent as to sputtering of anything, let alone as recited in claim 20.

Gas Supply Control

Appellant also submits that the cited portions of Klebanoff fail to disclose or teach a gas supply control configured to control supply of the gaseous hydrocarbon to the space to maintain a layer formed on the mirror using the gaseous hydrocarbon at a substantially constant thickness in response to at least sputtering caused during supply of the projection beam, as recited in claim 20.

The Final Office Action alleged (see page 4 of the Final Office Action) that:

> [Klebanoff's disclosure of] *'Prior to exposing surface 210 to incident radiation, a small amount of a hydrocarbon gas that will also bind to surface 210 is admitted to the system' means that the binding of the hydrocarbon gas to the surface 210 forms a cap layer of hydrocarbon on the surface 210 before the cap layer is sputtered by the incident radiation. Moreover, because the sputtering will cause the hydrocarbon molecules bound to the surface 210 be dissociated, the thickness of the cap layer of hydrocarbon would not increase substantially over time. In addition, since the pressure gas is maintained at a certain value, the thickness of the hydrocarbon layer would not increase substantially over time due to the increase of the pressure gas*), wherein, in use, the layer of hydrocarbon is formed on the mirror by absorption

> of the gaseous hydrocarbon (*column 2, lines 14-16: 'Surface 110 has both hydrocarbon and water molecules adsorbed thereon'*)" (emphasis in original).

Appellant respectfully traverses this allegation as at least unsupported by the cited reference.

First, Appellant submits that there is no support in the cited portions of Klebanoff, nor does it necessarily result from the cited portions of Klebanoff, that there would be a layer formed on the mirror using the gaseous hydrocarbon as claimed. For example, Klebanoff warns against a graphitic carbon film and teaches to remove such a film. See, e.g., Klebanoff, col. 4, lines 8-21. Accordingly, even in the absence of sputtering, Klebanoff teaches against a layer formed on the mirror using the gaseous hydrocarbon. Further, there is no disclosure or teaching in the cited portions of Klebanoff that there would be such a layer maintained in an environment of sputtering. Rather, sputtering would remove any layer. See, e.g., paragraph [0023] of Appellant's specification ("...the cap layer is gradually destroyed by sputtering.") Accordingly, Appellant submits that there is no disclosure or teaching in the cited portions of Klebanoff of control of the supply of gaseous hydrocarbon to maintain a layer formed on the mirror using the gaseous hydrocarbon at a substantially constant thickness in response to at least sputtering caused during supply of the projection beam.

Further, the allegation that "since the pressure gas is maintained at a certain value, the thickness of the hydrocarbon layer would not increase substantially over time due to the increase of the pressure gas" is not supported by the cited portions

of Klebanoff. All pressures and partial pressures disclosed by Klebanoff are filling pressures. Klebanoff is silent as to the allegation that "the pressure gas is maintained at a certain value." Even if *arguendo* the pressure of the gas in Klebanoff were maintained at a certain value, there is simply no disclosure of, nor would it necessarily result, that a constant pressure would ensure that a thickness of a layer formed on a mirror using gaseous hydrocarbon would not increase substantially over time as alleged. For example, the layer could simply be removed by the sputtering leaving no layer. Thus, keeping the pressure constant may have no effect. Moreover, there is no disclosure, nor would it necessarily result, that an increasing pressure would cause increase of the thickness of a layer.

Thus, Appellant submits that the cited portions of Klebanoff are simply silent as to a gas supply control configured to control supply of the gaseous hydrocarbon to the space to maintain a layer formed on the mirror using the gaseous hydrocarbon at a substantially constant thickness in response to at least sputtering caused during supply of the projection beam, as recited in claim 20.

Improper Combination of Tanaka and Klebanoff

Appellant submits that a proper *prima facie* case of obviousness has not been established because the cited portions of Tanaka and Klebanoff are improperly combined. In particular, the cited portions of Klebanoff and Tanaka conflict, the proposed modification of the system described in the cited portions of Tanaka would

render the Tanaka system unsatisfactory for its intended purpose, and a reasonable expectation of success for the proposed modification has not been set forth.

The Final Office Action essentially proposes that the inert gas disclosed in the cited portions of Tanaka may be supplemented with hydrocarbon or else substituted with hydrocarbon. Respectfully, this is contrary to the teachings regarding the system described in the cited portions of Tanaka. Such a combination or substitution would render the Tanaka system unsatisfactory for its intended purpose. In particular, the cited portions of Tanaka disclose the aim of having an optical system with hardly any ArF excimer laser light attenuation. See, e.g., Tanaka, para. [0008]. To that end, the cited portions of Tanaka disclose circulating inert gas through spaces in the optical system to improve transmittance by removing "foreign matter...such as water and hydrocarbons or other substances that diffuse the exposure light [, that] become adhered to the lenses 21 or suspended within the light path." See Tanaka, paras. [0045], [0088]. Therefore, the Final Office Action's contention that Tanaka's system may be configured to add hydrocarbon, which Tanaka characterizes as "foreign matter" that attenuates ArF laser light and which Tanaka expressly discloses removing through circulation of inert gas, simply flies in the face of Tanaka's teachings and the understanding of those skilled in the art. Indeed, Appellant submits that the cited portions of Tanaka expressly teach against supplying a hydrocarbon into the spaces in an optical system and thus cannot be combinable with any art that teaches such supply of a hydrocarbon into a space having an optical element.

Indeed, the cited portions of Klebanoff provide teachings that clearly conflict with Tanaka and that would render the modified Tanaka system unsatisfactory. Particularly, the cited portions of Klebanoff disclose supplying a hydrocarbon but in combination with the presence of water vapor and EUV radiation. See, e.g., Klebanoff, col. 3, lines 60 to col. 4, line 7. Moreover, the presence of such a hydrocarbon can lead to reduction in the reflectivity of mirror surfaces. See, e.g., Klebanoff, col. 4, lines 8-15. To help overcome this reduction of reflectivity, Klebanoff discloses providing oxygen containing gas. Thus, the cited portions of Klebanoff disclose providing hydrocarbon, water vapor and oxygen, each of which the cited portions of Tanaka expressly teach to keep out of the optical system to improve transmittance. Thus, the addition of hydrocarbon in the Tanaka system directly conflicts with the teachings of Tanaka and would render the Tanaka system unsatisfactory for its intended purpose of having high transmittance.

Further, even if the proposed combination were otherwise proper, the Final Office Action has not shown a reasonable expectation of success for the proposed combination. The teachings of Klebanoff relate to high energy radiation, such as EUV radiation, while the teachings of Tanaka relate to relatively low energy radiation, i.e., ArF laser radiation. The Final Office Action has not established, based on evidence of record, that the introduction of a hydrocarbon as taught by Klebanoff would be effective in the ArF system described in the cited portions of Tanaka and the Final Office Action has not made the appropriate showing that there would be a reasonable expectation of success.

Accordingly, the cited portions of Tanaka and Klebanoff do not disclose, teach, or suggest each and every element of claims 1, 10, 15, and 20. Accordingly, reversal of the 35 U.S.C. § 103(a) rejection of claims 1, 10, 15, and 20 over Tanaka and Klebanoff is respectfully requested.

Claim 18

Appellant submits that the cited portions of Tanaka and Klebanoff do not at least disclose, teach, or render obvious a lithographic projection apparatus as recited in claim 1 wherein, *inter alia*, the gas supply control is configured to, responsive to the signal, maintain the thickness of the layer substantially constant during supply of the projection beam of radiation, as recited in claim 18.

In addition to the reasons recited above why the cited portions of Tanaka and Klebanoff fail to disclose or teach claim 1, from which claim 18 depends, the cited portions of Tanaka and Klebanoff further fail to disclose or teach a gas supply control configured to, responsive to the signal, maintain the thickness of the layer substantially constant during supply of the projection beam of radiation. For example, the cited portions of Tanaka are silent as to the thickness of a layer and indeed, teach away by advising to circulate inert gas through spaces in the optical system to improve transmittance by removing "foreign matter...such as water and hydrocarbons or other substances that diffuse the exposure light [, that] become adhered to the lenses 21 or suspended within the light path." See Tanaka, paras. [0045], [0088]. Accordingly, a layer of substantially constant thickness would be

anathema to Tanaka. Further, Klebanoff warns against a graphitic carbon film and teaches to remove such a film. See, e.g., Klebanoff, col. 4, lines 8-21. Therefore, Klebanoff teaches against a layer formed on the mirror. And, moreover, even if Klebanoff did disclose such a layer, there appears to be no disclosure or teaching in the cited portions of Klebanoff, and the Final Office has not identified any, of maintaining the thickness of the layer substantially constant during supply of a projection beam of radiation.

Claim 19

Appellant submits that the cited portions of Tanaka and Klebanoff do not disclose, teach, or render obvious a method of manufacturing a device using a lithographic projection apparatus as recited in claim 10 comprising, *inter alia*, responsive to the signal, maintaining the thickness of the layer substantially constant during supply of the projection beam of radiation.

In addition to the reasons recited above why the cited portions of Tanaka and Klebanoff fail to disclose or teach claim 10, from which claim 19 depends, the cited portions of Tanaka and Klebanoff further fail to disclose or teach maintaining the thickness of the layer substantially constant during supply of the projection beam of radiation. For example, the cited portions of Tanaka are silent as to the thickness of a layer and indeed, teach away by advising to circulate inert gas through spaces in the optical system to improve transmittance by removing "foreign matter...such as water and hydrocarbons or other substances that diffuse the exposure light [, that]

become adhered to the lenses 21 or suspended within the light path." See Tanaka, paras. [0045], [0088]. Accordingly, a layer of substantially constant thickness would be anathema to Tanaka. Further, Klebanoff warns against a graphitic carbon film and teaches to remove such a film. See, e.g., Klebanoff, col. 4, lines 8-21. Therefore, Klebanoff teaches against a layer formed on the mirror. And, moreover, even if Klebanoff did disclose such a layer, there appears to be no disclosure or teaching in the cited portions of Klebanoff, and the Final Office has not identified any, of maintaining the thickness of the layer substantially constant during supply of a projection beam of radiation.

Claim 22

Appellant submits that the cited portions of Tanaka and Klebanoff do not at least disclose, teach, or render obvious a lithographic projection apparatus as recited in claim 20 further comprising, *inter alia*, a reflectivity sensor configured to monitor a reflectivity of the mirror, a pressure sensor configured to monitor a background pressure in the space, or both, and wherein the gas supply control is configured to, responsive to a signal from the at least one sensor, control the supply of the gaseous hydrocarbon to the space.

In addition to the reasons recited above why the cited portions of Tanaka and Klebanoff fail to disclose or teach claim 20, from which claim 22 depends, the cited portions of Tanaka and Klebanoff further fail to disclose or teach the claimed sensor(s) and wherein the gas supply control is configured to, responsive to a signal

from the sensor(s), control the supply of the gaseous hydrocarbon to the space. For example, the cited portions of Klebanoff fail to disclose, teach or suggest any sort of gas supply control, let alone one responsive to a signal from a sensor such as a reflectivity sensor or a pressure sensor or one configured to control the gas supply as claimed.

Moreover, the pressure sensor of Tanaka is merely used to determine whether a space in the optical system of Tanaka has been sufficiently evacuated so that the inert gas can be introduced and then to monitor the supply of the inert gas so as not to be overly pressurized to thereby impact optical performance. See, e.g., Tanaka, paragraphs [0044] and [0054]. Further, the pressure sensor of Tanaka is merely used to control a lens element to optically compensate for the pressure of the inert gas. See, e.g., Tanaka, paragraph [0041]. Thus, Appellant respectfully submits that the cited portions of Tanaka fail to disclose or teach a gas supply control configured to, responsive to a signal from, e.g., a pressure sensor, control supply of the gaseous hydrocarbon to the space to maintain a layer formed on the mirror using the gaseous hydrocarbon at a substantially constant thickness in response to at least sputtering caused during supply of the projection beam. Even if the system disclosed in the cited portions of Tanaka were modified to include supply of a hydrocarbon (which Appellant disagrees it properly could in view of Klebanoff as discussed above), it is respectfully submitted that the cited portions of Tanaka fail to provide any disclosure or teaching regarding a control system to control supply of a gas to maintain a layer formed on the mirror using the gaseous hydrocarbon at a

substantially constant thickness in response to at least sputtering caused during supply of the projection beam. The cited portions of Tanaka at most teach controlling whether the pressure is too high or low in the space but in no way teach control of the supply of gas to maintain a layer at a substantially constant thickness. Indeed, the cited portions of Tanaka do not even disclose a layer formed on an optical element and consequently cannot even teach or suggest control supply of a gas to maintain the thickness of such a layer constant.

Claims 2-9, 11, 12, 16, 21 and 23-26

Claims 2-9, 11, 12, 16, 21 and 23-26 depend from claims 1, 10, 15, or 20 and, therefore, are patentable for at least the reasons provided above with respect to claims 1, 10, 15 and 20, and for the additional features recited therein.

B. Rejection under 35 U.S.C. §103(a) of claim 13 under Tanaka, in view of Klebanoff, and further in view of Duveneck.

Claim 13

As discussed above, Appellant respectfully submits that cited portions of Tanaka and Klebanoff, either alone or in combination with one another, do not disclose, teach, or render obvious claim 10. Accordingly, the cited portions of Tanaka and Klebanoff do not disclose, teach, or render obvious each and every

element of claim 13 at least by virtue of its dependency from claim 10, as well as the additional recitations therein.

Even assuming *arguendo* that the cited portions of Tanaka, Klebanoff and Duveneck are properly combinable (which Appellant does not concede at least for reasons discussed above), Appellant submits that the cited portions of Duveneck fail to overcome the shortcomings of the cited portions of Klebanoff and Tanaka. For example, the cited portions of Duveneck merely disclose a 40 layer high efficiency mirror. Appellant submits that the cited portions of Duveneck are silent as to, *inter alia*, supplying a gaseous hydrocarbon to a space within the lithographic projection apparatus containing a mirror; monitoring at least one of a reflectivity of said mirror and a background pressure in said space; and controlling an amount of gaseous hydrocarbon supplied to said space to control, in response to the monitoring, a thickness of a hydrocarbon layer formed on the mirror using the gaseous hydrocarbon.

Accordingly, the cited portions of Tanaka, Klebanoff and Duveneck do not disclose, teach, or render obvious each and every element of claim 13. Accordingly, reversal of the 35 U.S.C. § 103(a) rejection of claim 13 over Tanaka, Klebanoff, and Duveneck is respectfully requested.

VIII. 37 C.F.R. §41.37(c)(1)(viii) - CLAIMS APPENDIX

Appendix A: The pending claims (claims 1-13, 15, 16, and 18-26) are attached in Appendix A.

IX. 37 C.F.R. §41.37(c)(1)(ix) - EVIDENCE APPENDIX

Appendix B: (None)

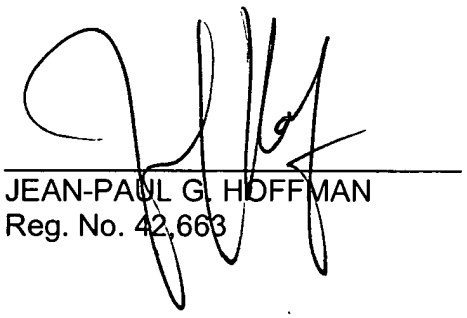
X. 37 C.F.R. §41.37(c)(1)(x) - RELATED PROCEEDINGS INDEX

Appendix C: (None)

CONCLUSION

For at least the foregoing reasons, Appellant respectfully requests that the rejection of each of pending claims 1-13, 15, 16, and 18-26 be reversed.

Respectfully submitted,



Date: November 6, 2008

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APPENDIX A

CLAIMS

1. (Previously Presented) A lithographic projection apparatus comprising:

a radiation system to supply a projection beam of radiation;

a support structure adapted to support patterning structure which can be used to pattern the projection beam according to a desired pattern;

a substrate table to hold a substrate;

a projection system to project the patterned beam onto a target portion of the substrate;

a gas supply, configured and arranged to supply a gaseous hydrocarbon to a space containing a mirror;

at least one sensor selected from the group comprising a reflectivity sensor to monitor a reflectivity of said mirror and a pressure sensor to monitor a background pressure in said space; and

a gas supply control to control said gas supply to control, responsive to a signal from said at least one sensor, a thickness of a layer of hydrocarbon formed on the mirror using the gaseous hydrocarbon.

2. (Original) An apparatus according to claim 1, wherein the radiation system contains said space containing the mirror.

3. (Previously Presented) An apparatus according to claim 1, wherein the radiation system comprises a laser-produced plasma source or a discharge source adapted to supply a beam of extreme ultraviolet (EUV) radiation as said projection beam.

4. (Original) An apparatus according to claim 3, wherein said beam of extreme ultraviolet radiation has a wavelength of less than about 50nm.

5. (Original) An apparatus according to claim 4, wherein said beam of extreme ultraviolet radiation has a wavelength in the range of from 8 to 20nm

6. (Original) An apparatus according to claim 5 wherein said range is from 9 to 16 nm.

7. (Original) An apparatus according to claim 1, wherein the hydrocarbon is an alcohol.

8. (Original) An apparatus according to claim 7, wherein the alcohol is ethanol.

9. (Original) An apparatus according to claim 1 wherein the mirror is a collector mirror.

10. (Previously Presented) A method of manufacturing a device using a lithographic projection apparatus comprising:

projecting a patterned beam of radiation onto a target portion of a layer of radiation-sensitive material on a substrate;

supplying a gaseous hydrocarbon to a space within the lithographic projection apparatus containing a mirror;

monitoring at least one of a reflectivity of said mirror and a background pressure in said space; and

controlling an amount of gaseous hydrocarbon supplied to said space to control, in response to the monitoring, a thickness of a hydrocarbon layer formed on the mirror using the gaseous hydrocarbon.

11. (Original) A method according to claim 10, wherein the hydrocarbon is an alcohol.

12. (Original) A method according to claim 11, wherein the alcohol is ethanol.

13. (Previously Presented) A method according to claim 10, wherein said mirror comprises at least 40 multilayers and wherein the method further comprises adapting the amount of gaseous hydrocarbon supplied to the space such that at least part of at least a top layer of said mirror undergoes sputtering.

14. (Cancelled)

15. (Previously Presented) A method of manufacturing a device using a lithographic projection apparatus comprising:

projecting a patterned beam of radiation onto a target portion of a layer of radiation-sensitive material on a substrate; and

supplying a gaseous alcohol to a space in a radiation system of the lithographic projection apparatus, which space contains a mirror,

wherein the alcohol forms a cap layer on said mirror, wherein the projecting causes sputtering of the cap layer, and wherein the gaseous alcohol is supplied to said space at a pressure sufficient to achieve a thickness of said cap layer which does not increase substantially over time.

16. (Previously Presented) A method according to claim 15, wherein the alcohol is ethanol.

17. (Cancelled)

18. (Previously Presented) The apparatus of claim 1, wherein the gas supply control is configured to, responsive to the signal, maintain the thickness of the layer substantially constant during supply of the projection beam of radiation.

19. (Previously Presented) The method of claim 10, comprising, responsive to the signal, maintaining the thickness of the layer substantially constant during supply of the projection beam of radiation.

20. (Previously Presented) A lithographic projection apparatus comprising:

a support structure adapted to support patterning structure which can be used to pattern a beam of radiation according to a desired pattern;

a substrate table to hold a substrate;

a projection system to project the patterned beam onto a target portion of the substrate;

a gas supply configured to supply a gaseous hydrocarbon to a space containing a mirror; and

a gas supply control configured to control supply of the gaseous hydrocarbon to the space to maintain a layer formed on the mirror using the gaseous hydrocarbon at a substantially constant thickness in response to at least sputtering caused during supply of the projection beam.

21. (Previously Presented) The apparatus of claim 20, wherein the hydrocarbon comprises alcohol.

22. (Previously Presented) The apparatus of claim 20, further comprising a reflectivity sensor configured to monitor a reflectivity of the mirror, a pressure sensor configured to monitor a background pressure in the space, or both, and wherein the

gas supply control is configured to, responsive to a signal from the at least one sensor, control the supply of the gaseous hydrocarbon to the space.

23. (Previously Presented) The apparatus of claim 1, wherein, in use, the layer of hydrocarbon is formed on the mirror by adsorption of the gaseous hydrocarbon.

24. (Previously Presented) The method of claim 10 comprising forming the layer of hydrocarbon on the mirror by adsorption of the gaseous hydrocarbon.

25. (Previously Presented) The method of claim 15 comprising forming the cap layer on the mirror by adsorption of the gaseous alcohol.

26. (Previously Presented) The apparatus of claim 20, wherein, in use, the layer formed on the mirror is maintained by adsorption of the gaseous hydrocarbon.

APPENDIX B

EVIDENCE APPENDIX

NONE

APPENDIX C

RELATED PROCEEDINGS INDEX

NONE